U. S. FOREST SERVICE RESEARCH NOTE NE-87

1968

Northeastern Forest

FOREST SERVICE, U. S. DEPT. OF AGRICULTURE, 6816 MARKET STREET, UPPER DARBY, PA.

Experiment Station

SPREAD OF *FOMES ANNOSUS* ROOT ROT IN THINNED SHORTLEAF PINE PLANTATIONS

Abstract.—Plots were established in thinned shortleaf pine plantations in Missouri to determine the rate of spread of *Fomes annosus* root rot over a 5-year period. On these plots mortality from *F. annosus* was about 5 trees per acre per year.

Foresters, pulpwood and timber operators, and forest landowners are becoming increasingly concerned about losses from a widely distributed fungus, *Fomes annosus* (Fr.) Cke., that has already caused much mortality of pines and other conifers, both in this country and abroad.

F. annosus frequently becomes established in healthy stands during thinning operations. Airborne spores land on freshly cut stump surfaces and the fungus grows down into the roots and infects roots of adjacent trees at points of contact. Once roots become infected, the fungus may survive below ground for 50 years or more. The rate of growth of the fungus in roots averages about 3 feet a year, so at least 2 to 3 years elapse after thinning before mortality from *F. annosus* begins to show up. As more and more trees become diseased, the infection center gradually enlarges.

The fungus produces fruit bodies or conks at the root collar or on roots of living infected trees as well as on stumps, dead trees, and slash. These conks, which are perennial, range in size from small button-shaped pustules up to brackets several inches across. Since they are usually produced at or below the ground line, it is often necessary to remove needle duff from around the base of a tree or stump to see them.

Figure 1.—A *Fomes annosus* infection center in a shortleaf pine plantation. The plantation, which was 26 years old when the photograph was taken, had been thinned 5 years previously.

In 1961 a survey of shortleaf pine areas in southern Missouri revealed that *F. annosus* root rot was widely distributed.[1] Damage was much more severe in plantations than in natural stands. All the infected plantations had been thinned in the past. Since all our native conifers are probably susceptible to *F. annosus,* the many old-field plantations that have been established in this country are threatened (fig. 1).

To follow more closely the progress of *F. annosus* root rot in thinned pine plantations and learn what losses are to be expected, a number of permanent study plots were established. The following criteria were used in selecting locations for these plots:

1. The plantation should not have been thinned more than 6 years earlier.

2. The plantation should not have been thinned more than once.

[1] Berry, F. H., and O. J. Dooling. *Fomes annosus* on shortleaf pine in Missouri. U.S.D.A. Plant Dis. Rep. 46: 521. 1962.

3. The plantation should be on an area uniform in topography and site.

4. The plot should be only lightly infected with *F. annosus,* preferably with only one infection center of 1 to 6 dead or definitely infected trees.

In the spring of 1963, nine 1/5-acre plots that met the above criteria were established in thinned shortleaf pine plantations in southern Missouri. Each plot was surrounded by a 1-chain-wide isolation strip. Each

Table 1.—*Shortleaf pine mortality in* Fomes annosus *spread plots in southern Missouri*

Plot no.	Location	Trees in plot	Trees killed by *Fomes annosus*[1]						5-year increase
			1963		1965		1968		
		No.	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*	*No.*
1	Meramec State Forest	86	2	2.3	6	7.0	13	15.1	11
2	Deer Run State Forest	63	5	7.9	10	15.9	10	15.9	5
3	Deer Run State Forest	70	2	2.9	2	2.9	2	2.9	0
4	Mark Twain National Forest	118	4	3.4	12	10.2	15	12.7	11
5	Mark Twain National Forest	117	6	5.1	11	9.4	14	12.0	8
6	Clark National Forest	41	1	2.4	3	7.3	3	7.3	2
7	Clark National Forest	46	2	4.3	2	4.3	2	4.3	0
8	Clark National Forest	128	1	.8	4	3.1	5	3.9	4
9	Clark National Forest	118	2	1.7	4	3.4	4	3.4	2
	Total	787	25	3.2	54	6.9	68	8.6	43

[1] Based on the presence of *F. annosus* fruiting bodies on the dead trees.

tree on the plot was given a permanent number, and data on site index, soil type, topography, aspect, and pH were collected.

The spread of *F. annosus* root rot in these plots over a 5-year period was traced (table 1). From 1963 to 65, mortality from *F. annosus* increased in seven of the nine plots. The average number of trees killed during this period was 3.2 trees per plot, varying from 8 trees on one plot to none on two others. Rate of *F. annosus* spread was considerably less in 1965 to 68. An average of only 1.6 trees per plot were killed by *F. annosus* during this period. On two plots no additional trees were killed by *F. annosus* after 1963. Over the entire 5-year period, *F. annosus* killed a total of 43 trees. From these plots we estimate that mortality from *F. annosus* would be about 5 trees per acre per year in thinned shortleaf pine plantations in Missouri.

During the re-examination of these plots, *F. annosus* sporophores were found on trees that from their crowns appeared to be perfectly healthy. In fact, some of these trees had sporophores in 1963. It appears that at least under some conditions, *F. annosus* root rot develops rather slowly or that the fungus may live in and fruit on the outer bark before invading other portions of the root or stem.

It is still too early to determine what effect, if any, ecological factors may have had on the spread of the root rot. We plan to re-examine these plots again in 1970.

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